MARCH 1977
No. 3

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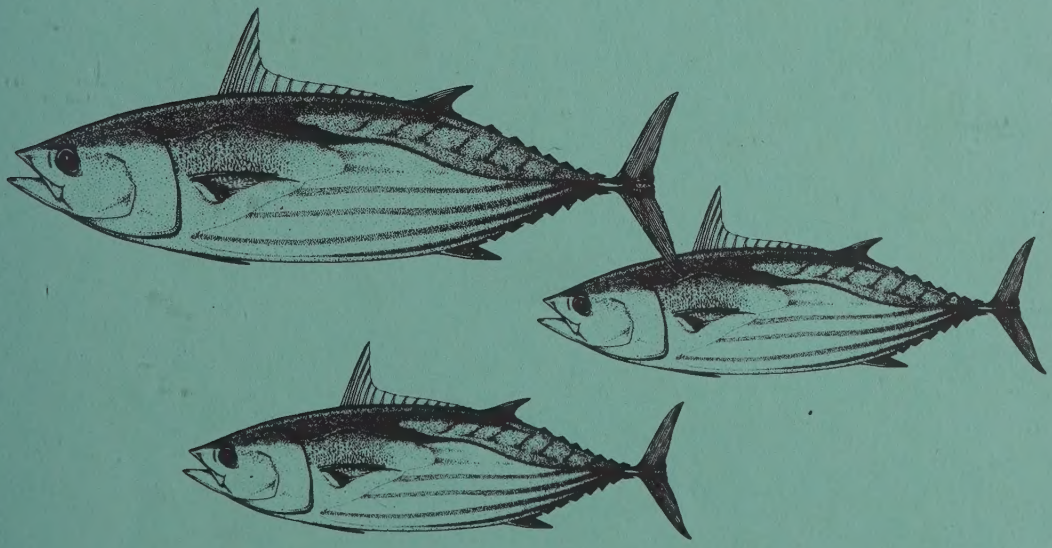

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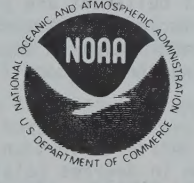

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. It contains a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

NOTE: In order to comply with the National Metric Conversion Act, the sea surface temperature data fields in this publication will be shown in degrees Celsius beginning with this issue.

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

Submitted for publication - April 21, 1977

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ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, and 15 day Supplement)

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    Columbia by L.F. Giovando from observations by
    L. Sabourin at Langara Island Light; D.C. Robinson at Cape St. James Light;
    L. Collins at Kains Island Light; I.G. McNeil at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California

Fishing Vessels, *Cabrillo, Jo Linda, Mary Barbara,* and *Santa Rosa.*

Expendable bathythermograph and salinity observations are made by the mates and engineers of the *Chevron California* of the Chevron Shipping Co., Ltd. The data are processed under supervision of D.R. McLain at the NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Science Foundation and the Office of Naval Research.

Sea Surface Temperature and Environmental Conditions

Forrest R. Miller

Eastern North Pacific

The atmospheric circulation patterns returned toward normal fairly rapidly by the end of February 1977 after nearly five months of unusually low pressures and persistent high winds and rough seas in the central and western part of the north Pacific. During the last week of February and the first week of March the Aleutian low shifted eastward toward the Gulf of Alaska and northwest Canada. At the same time the eastern Pacific high pressure center, which had remained nearly stationary during the winter along the entire U.S. and Canadian west coasts, moved southwestward toward its normal position (Figure 1). However, several times in March the central pressure of the eastern Pacific high increased as much as 15 millibars (mb) above normal between 130°W and 150°W while the Aleutian low developed very low pressures in the Gulf of Alaska. As a result, the monthly mean pressures in the eastern Pacific high pressure center were 8 to 12 mb above normal (compare Figures 1 and 2), and the Aleutian low had near normal pressures along the Aleutian Island chain and significantly below normal pressures over eastern Alaska and northwest Canada.

Although surface pressures north of 45°N and west of 140°W were near normal in March, the above normal pressures associated with the periodic buildup of the eastern Pacific high caused the pressure gradient and associated high winds to be above normal in the central Pacific west of 150°W as they were for the previous five months. This situation caused a continuation of strong ocean mixing which maintained the stronger than normal north-south sea surface temperature (SST) gradients from 32°N to 45°N west of 150°W (Figure 3). Therefore, there was no significant reduction from February through March in the area covered by SST's which were 1°C* or more below normal (Figure 5). Along the U.S. west coast the high pressure ridge moved westward which allowed weather fronts to generate more above-normal northerly winds and ocean mixing east of 140°W than had occurred for the past several months. As a result, SST's north of 30°N and east of 140°W cooled slightly faster than normal and the area of above normal SST's diminished significantly (Figure 5). However, within 600 miles of the West Coast and north of 25°N SST's continued to be 1°C or more higher than in March 1976 (see Figure 7). Along the coast of Baja California and westward into the subtropical Pacific, SST's cooled at a rate slightly more than normal. This is evident in Figure 5 by the large area covered by negative SST deviations and the decrease, since February, in the area with SST's more than 1°C above normal along Baja California. The cooling in the eastern subtropical Pacific was associated mainly with stronger than normal trade winds along the eastern and southern periphery of the very strong subtropical high pressure center.

Western North Pacific

The transition from a very cold north Pacific east of Japan during late 1976 and early 1977 began in mid-February. The cooling trend of SST's at rates less than normal between 35°N and 45°N continued in March 1977. As a result of the Aleutian low moving eastward in late February leaving weaker wind and ocean circulations between 160°E and Japan, SST's showed a positive departure from normal east of Japan from 35°N to 40°N (Figure 6) for the first time in several months. There remains, however, a very strong north-south SST gradient (Figure 4) off the east coast of northern Japan. In the central part of the western Pacific east of 160°E from 35°N to 45°N the SST's were

*Beginning in March 1977 all SST analyses and departures of SST's from normal will be presented in Celsius.

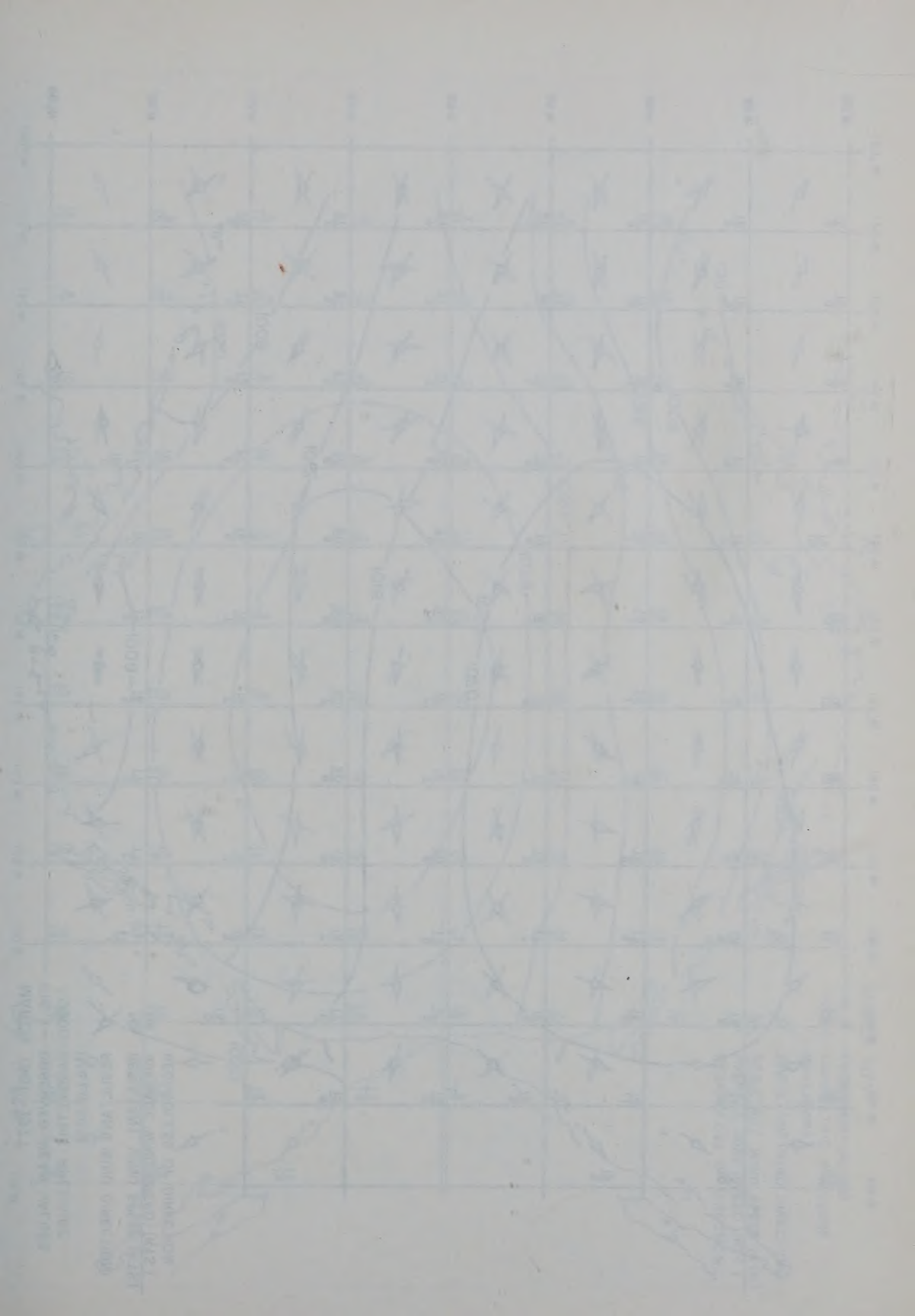
1 to 2°C below normal (Figure 6), as they were in February. The strong surface westerly winds continued to cause extensive ocean mixing from 40°N to 50°N between the Aleutian low pressure area and the very strong eastern Pacific high center. In the tropics and subtropics, high pressure and light winds resulted in SST's which were near normal over most of the western Pacific.

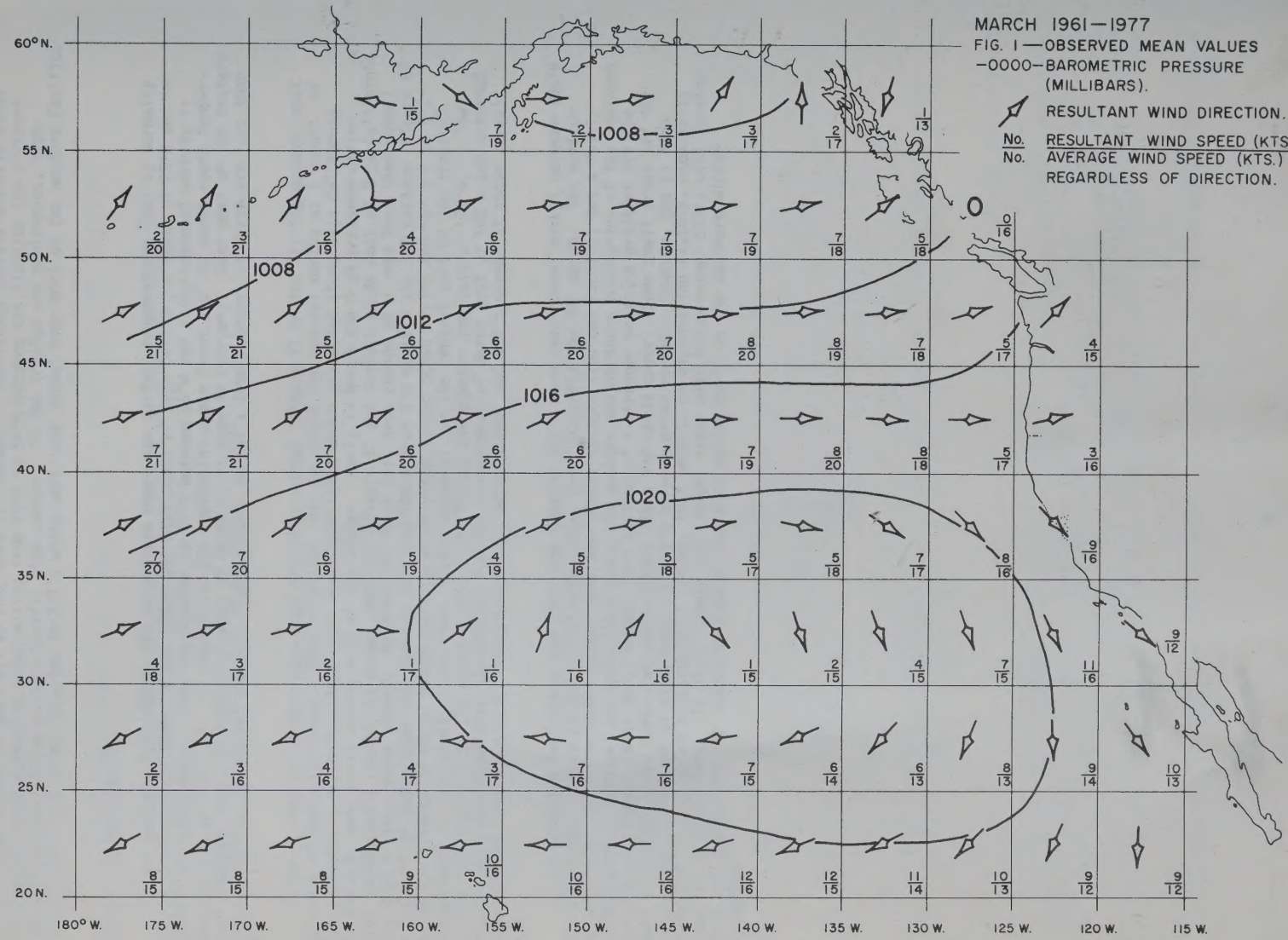
Eastern Tropical Pacific

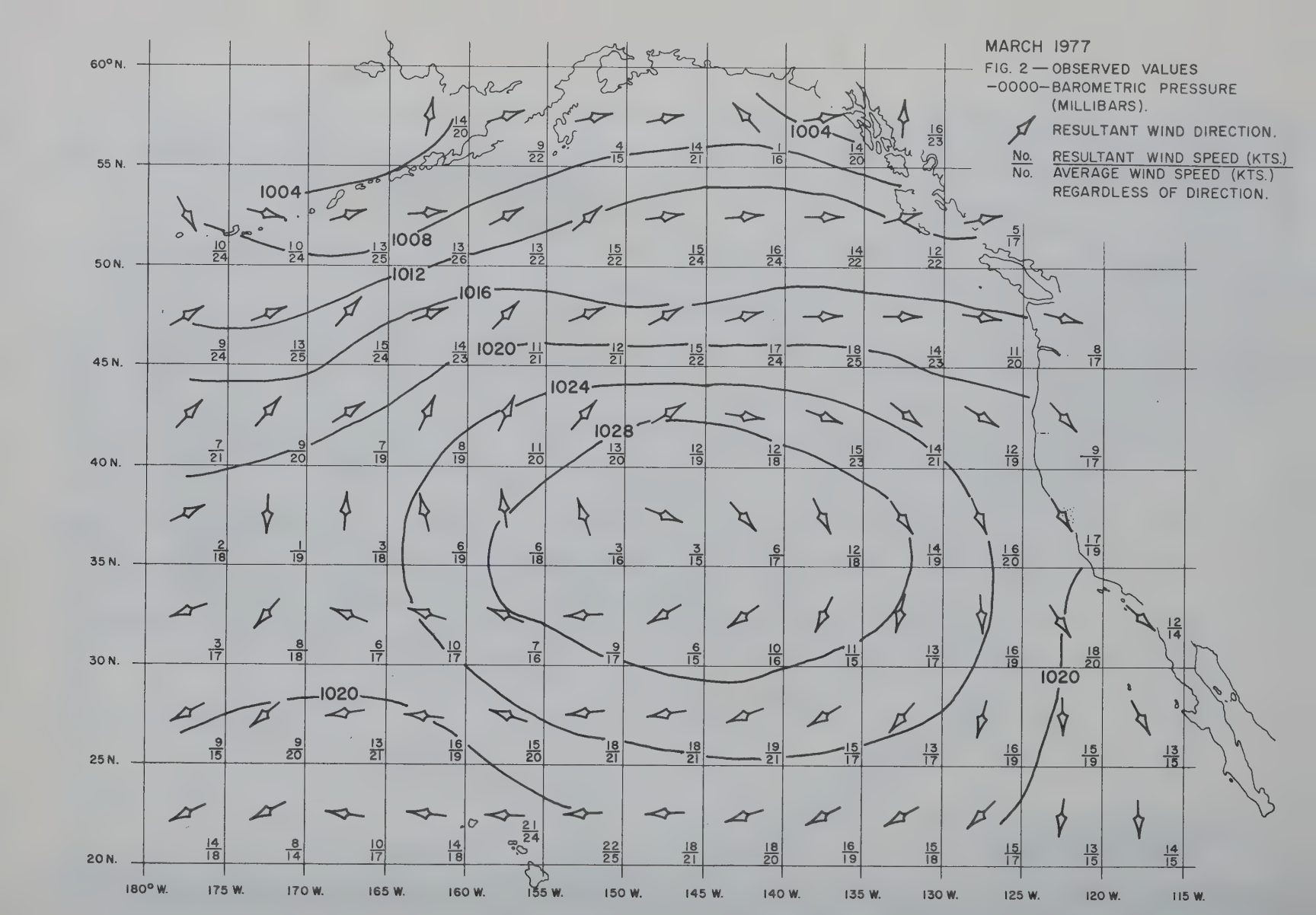
In the northern hemisphere, the only areas where sea surface temperatures (SST's) normally cool at rates greater than 1°C are along the west coast of Baja California south of 25°N and in the Gulf of Tehuantepec. From the equator to 10°S between 85°W and 110°W seasonal warming is normally greater than 1°C. In this area, the equatorial ocean front and its north-south temperature gradient normally remains as weak in March as it does in February. Over most of the eastern tropical Pacific the normal seasonal fluctuations in SST's from February to March are less than 1°C.

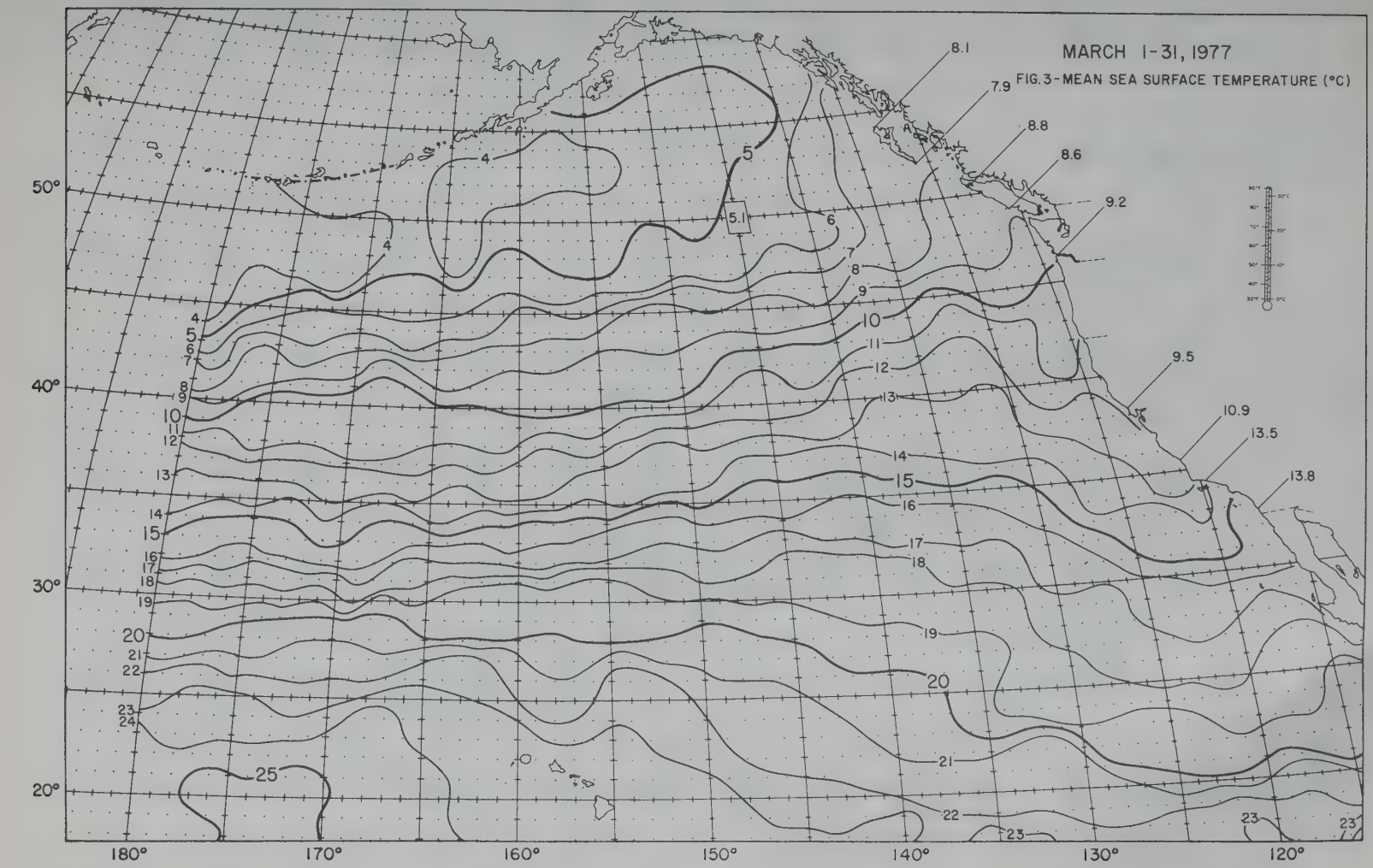
In March 1977 SST's were more than 1°C above normal (Figure 9) in the fishing grounds west and south of Baja California. This condition has persisted for several months as a result of high atmospheric pressure, light winds and clear skies which prevailed along Baja California and the U.S. west coast during most of the winter. Early in March the high pressure center moved soutwestward toward its normal position (Figure 2) and surface winds west of Baja California were 2 to 4 knots above normal. However, SST's in this area cooled at a rate less than normal. In the Gulf of Tehuantepec and between 90°W and 100°W from 5°N to 15°N the SST pattern (Figure 8) showed the effects of above normal surface winds which caused ocean mixing and SST's 1 to 2°C below normal in some areas of the tuna fishing grounds. In the central part of the tropical Pacific, SST's were 1 to 2°C above normal from 15°N to the equator and west of 170°W. A low pressure area persisted over the central Pacific during much of March west of 160°W and extended southwestward into the tropics where winds were below normal and SST's warmed at above normal rates.

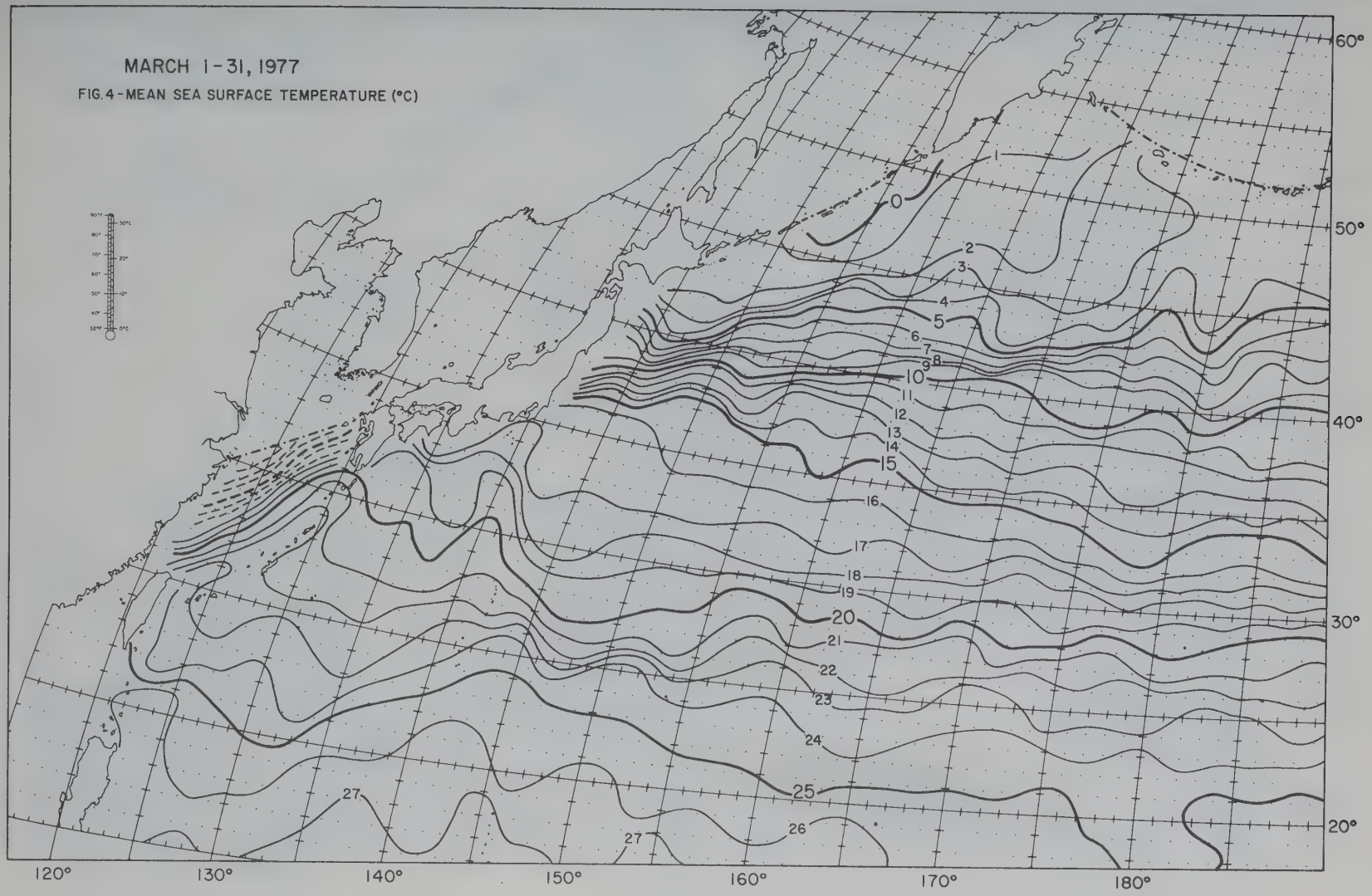
In the southern hemisphere and along the equator SST's were near normal except between 100°W and 130°W where surface pressures and wind speeds were unusually low for March. The surface pressures were 1 to 3 mb below normal over the entire eastern tropical Pacific, but a fairly strong pressure gradient was maintained along the eastern and northern boundaries of the southern high pressure center (near 30°S, 90°W). The buildup of a stronger pressure gradient off the coast of South America generated above normal winds and cloud cover. Some small areas off the coast of Peru continued to experience SST's 1°C or more above normal. However, the El Niño conditions of 1976 which extended into January 1977 seem to be diminishing rapidly, especially along the coast of Peru. It seems likely that larger areas with below normal SST's will develop along the equator and the coasts of Ecuador and Peru during April as the southern winter approaches.

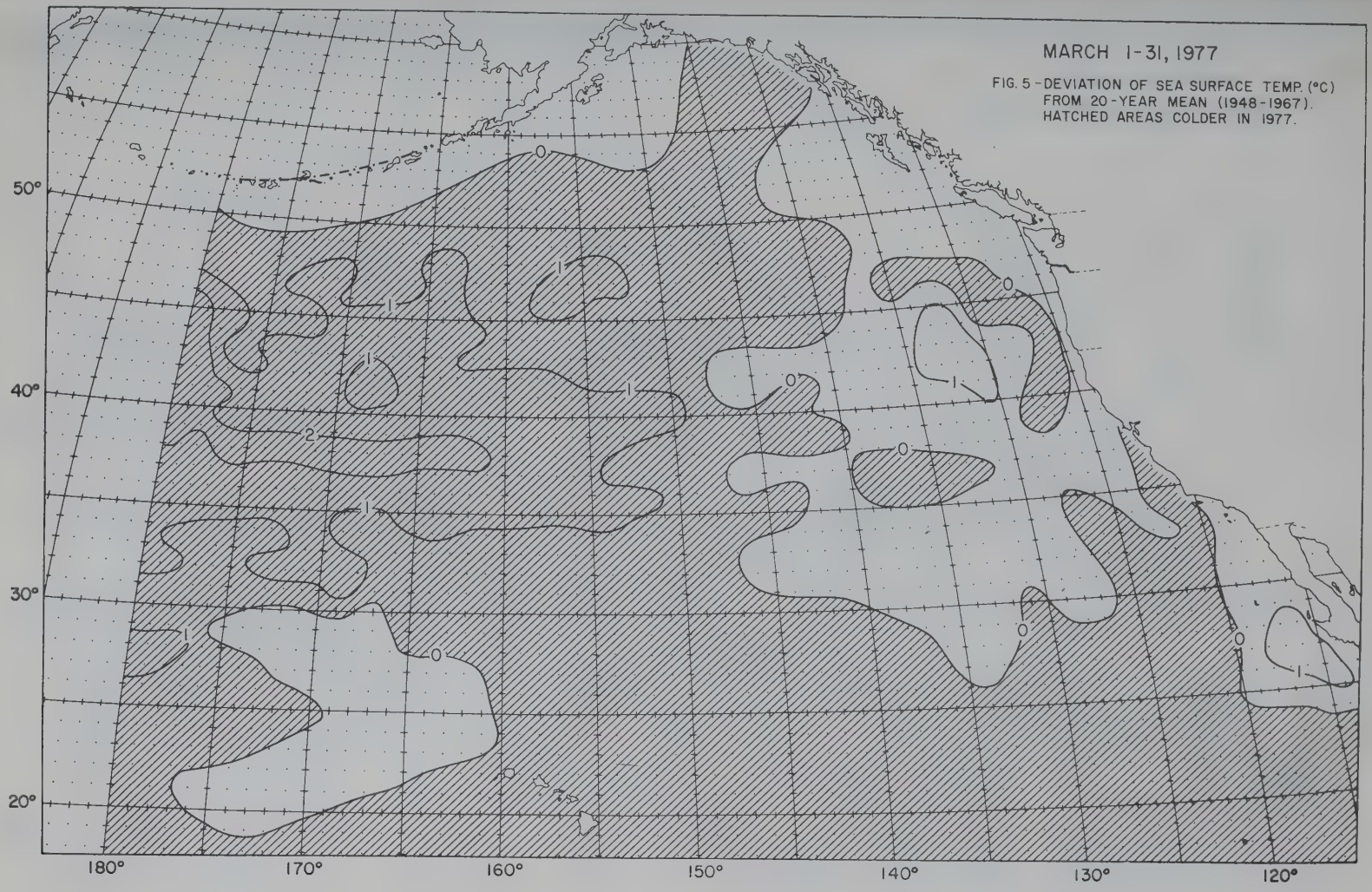



MARCH 1961—1977
FIG. 1—OBSERVED MEAN VALUES
—0000—BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.


MARCH 1977
FIG. 2 — OBSERVED VALUES
-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
1004
1008
1012
1016
1020
1024
1028
1004
1020


MARCH 1-31, 1977
FIG. 3 - MEAN SEA SURFACE TEMPERATURE (°C)
8.1
7.9
8.8
8.6
9.2
9.5
10.9
13.5
13.8
5.1
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MARCH 1-31, 1977
FIG. 4 - MEAN SEA SURFACE TEMPERATURE (°C)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
27
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


MARCH 1-31, 1977
FIG. 5 - DEVIATION OF SEA SURFACE TEMP. (°C) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1977.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
1
2

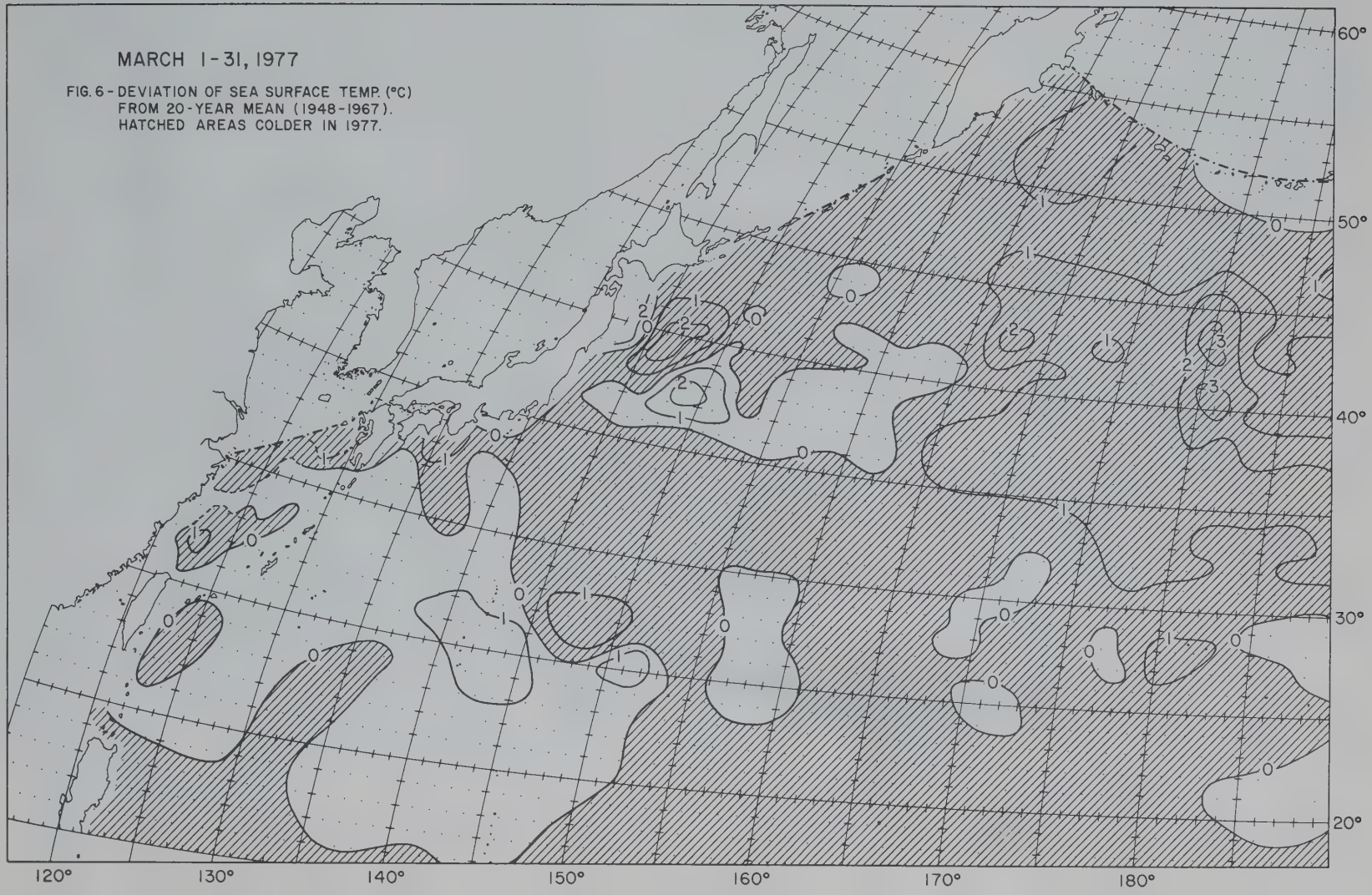

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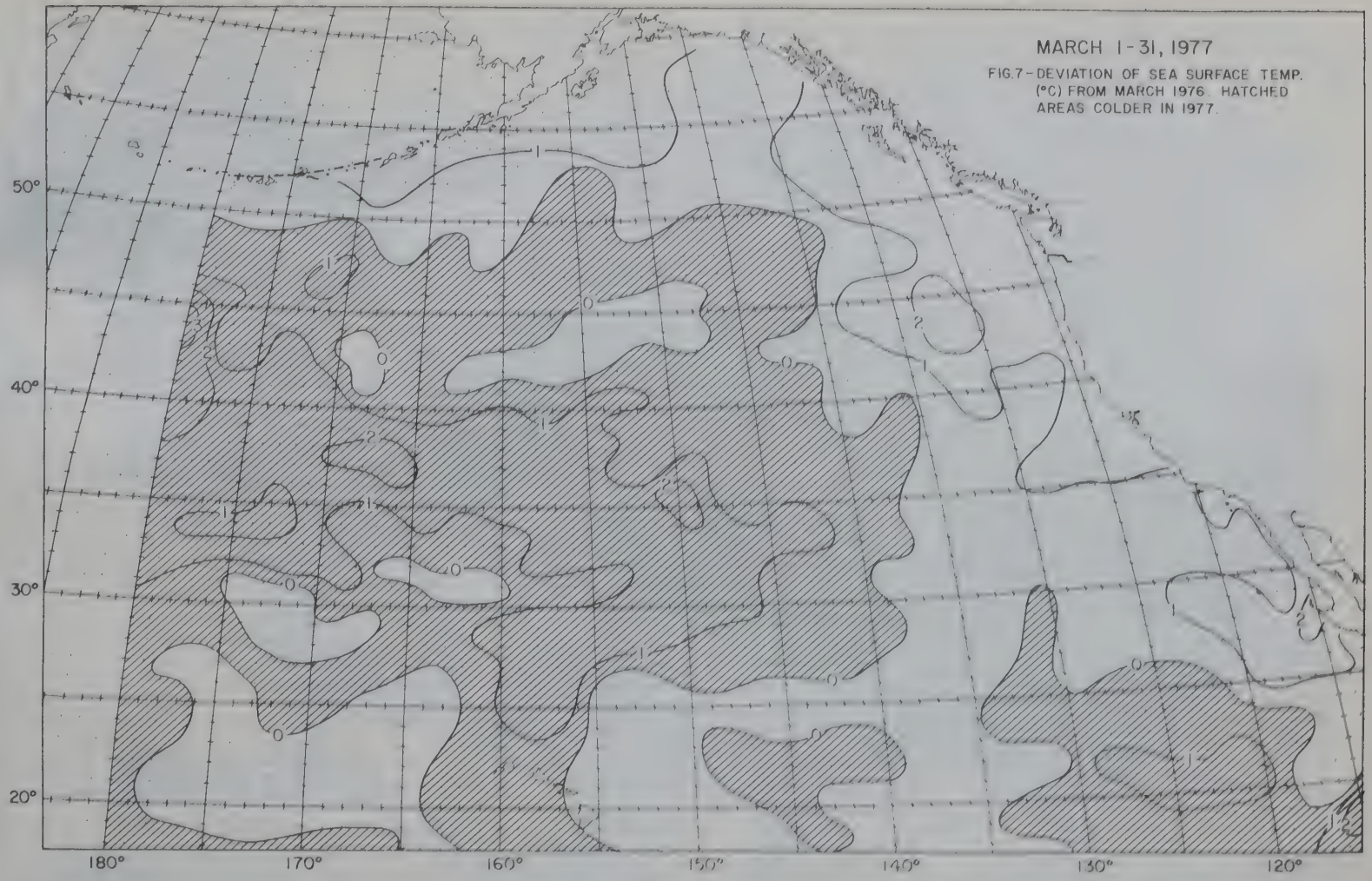
FIG. 6 - DEVIATION OF SEA SURFACE TEMP. (°C) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1977.
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


MARCH 1-31, 1977
FIG.7-DEVIATION OF SEA SURFACE TEMP. (°C) FROM MARCH 1976. HATCHED AREAS COLDER IN 1977.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

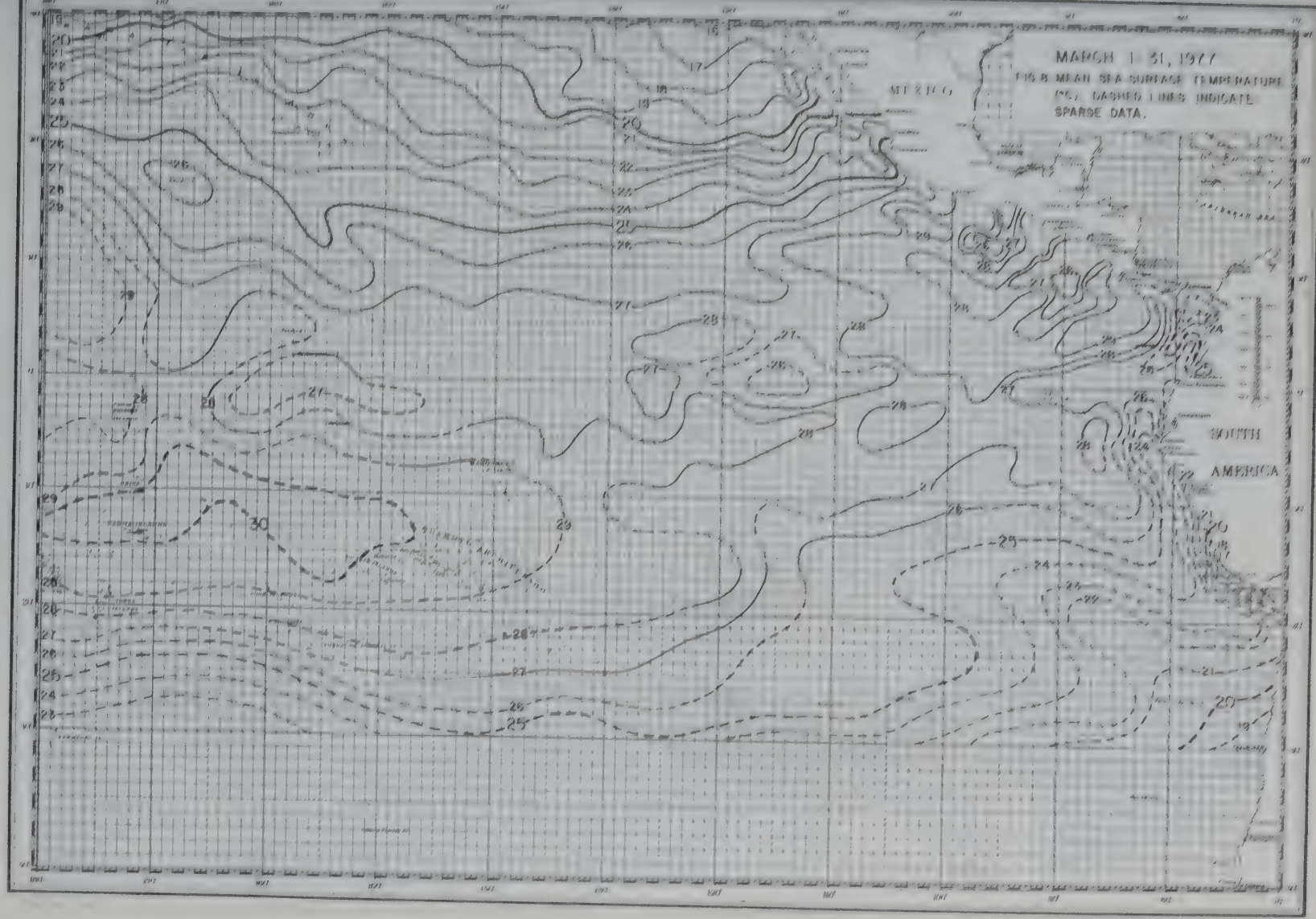

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FIG 8 MEAN SEA SURFACE TEMPERATURE (°C). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA

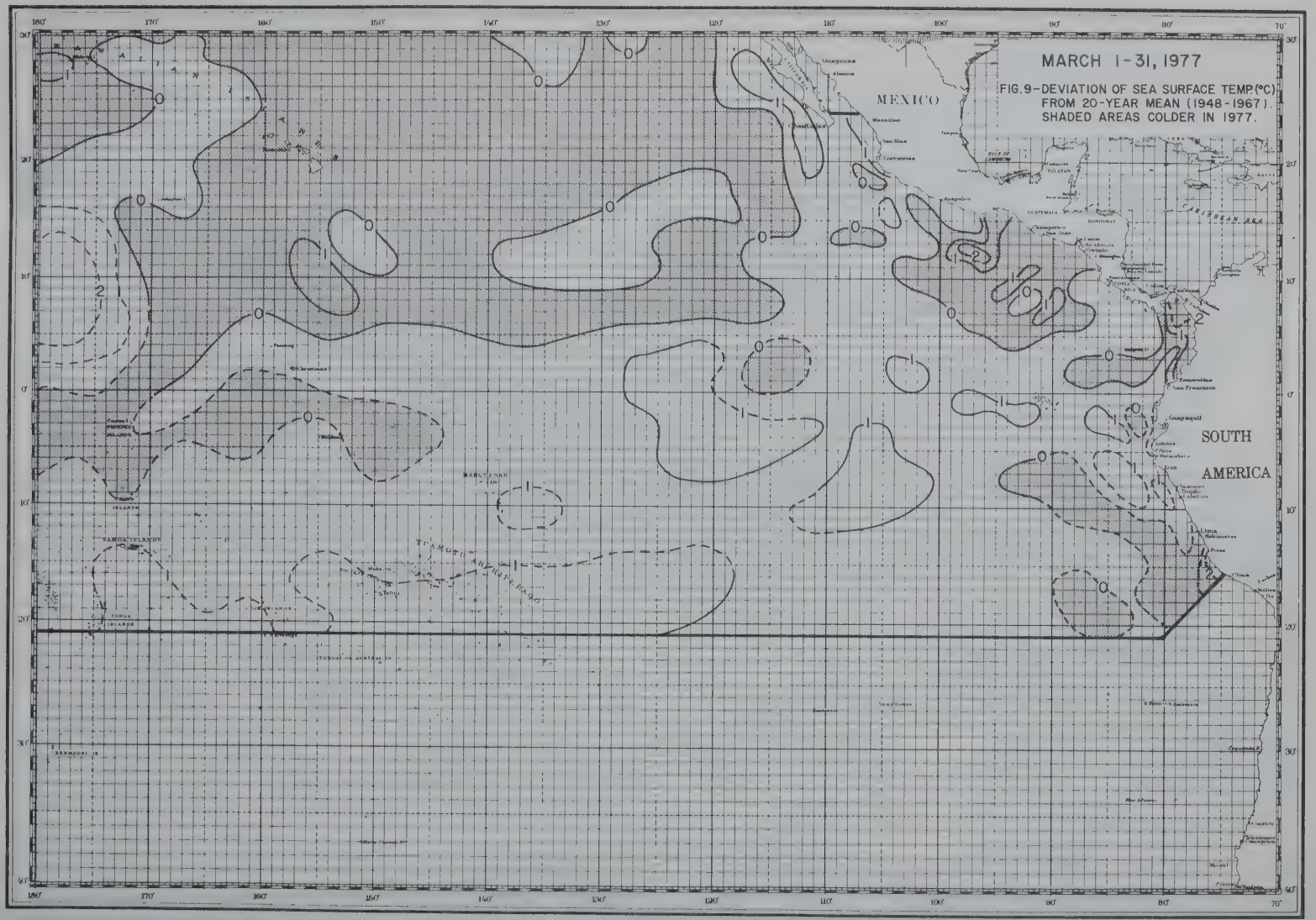
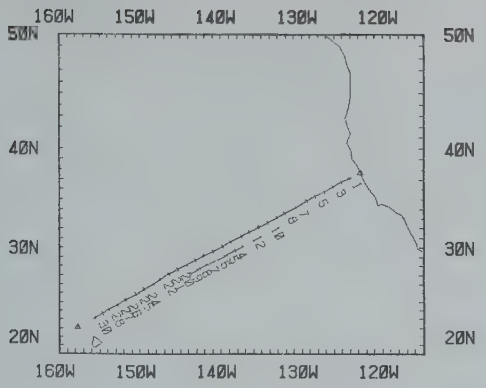

MARCH 1-31, 1977
FIG. 9-DEVIATION OF SEA SURFACE TEMP.(°C) FROM 20-YEAR MEAN (1948-1967). SHADED AREAS COLDER IN 1977.
MEXICO
SOUTH AMERICA
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
10°
20°
30°
40°

FIGURE 10



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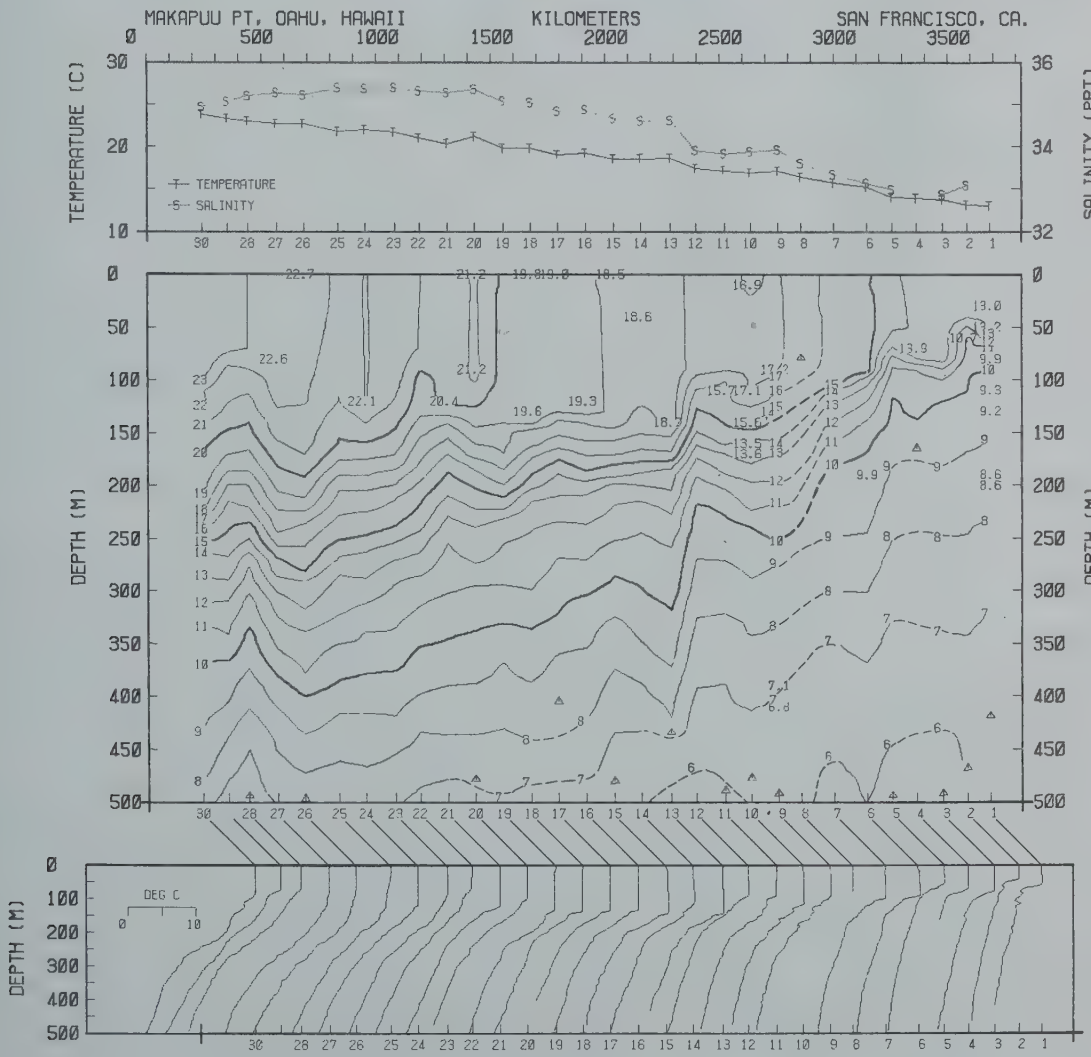

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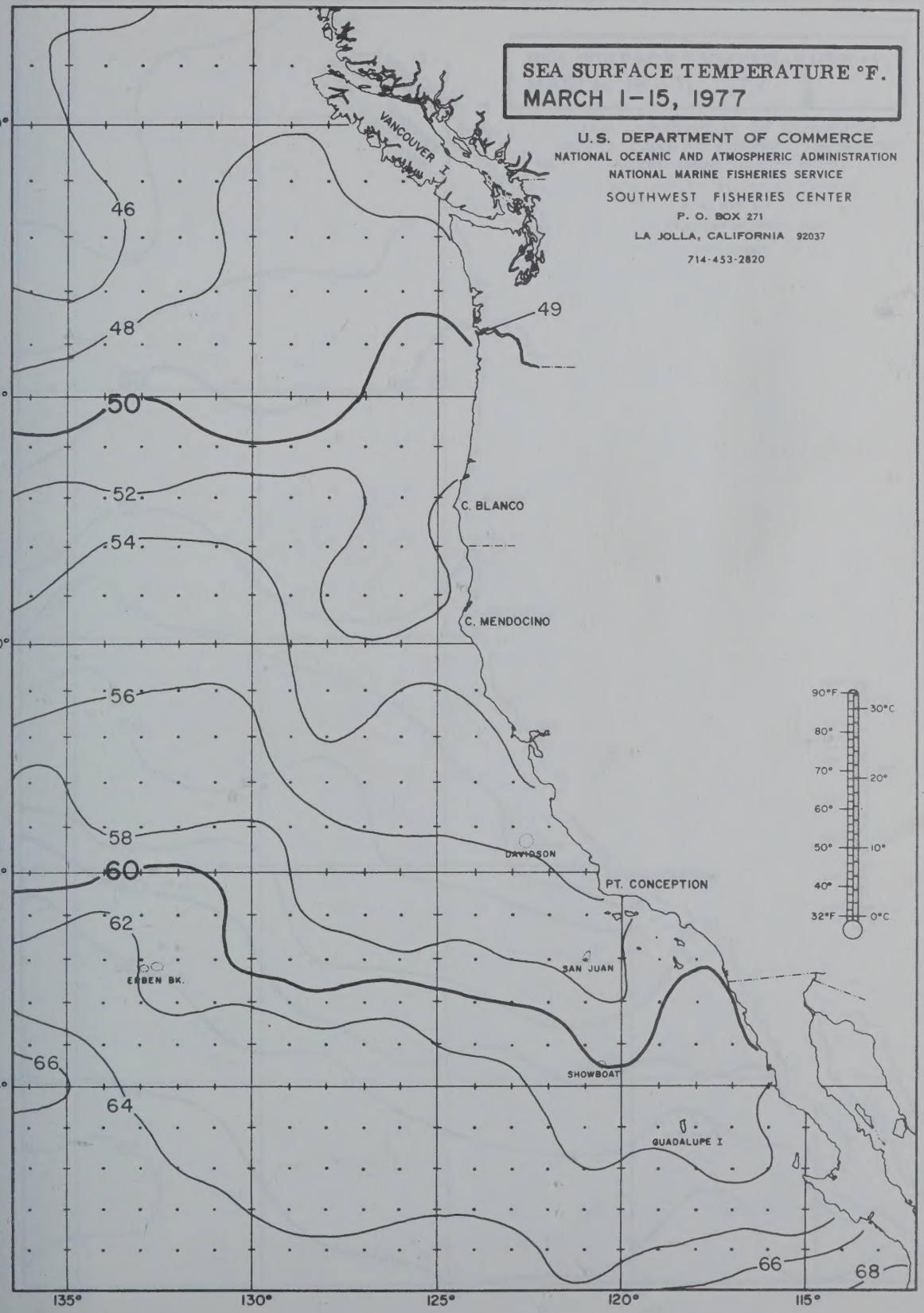

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